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The Effect of the Stage of Infection on the Response of T. congolense in Cattle to Phenanthridinium 1553

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During the past few years the cattle populations in certain districts of Uganda have been decimated by trypanosomiasis, and large scale outbreaks in tsetse-free areas have been attributed to mechanical transmission of *T. congolense* by *Stomoxys*, following the introduction of infected animals into healthy herds. Clinical and blood examinations have not proved satisfactory in diagnosis in the field, since negative results are not conclusive evidence that the animal is uninfected; therefore it would appear essential that all cattle in an infected herd be treated, irrespective of whether a proportion of the animals are negative to clinical and blood examination.

The first field trials with phenanthridinium 1553 were carried out during the latter part of 1945, and the drug, administered subcutaneously at a dosage of 2 mg./kg. was found to be too toxic for general use in the field. Results of investigations on the toxic effects of the drug have been recorded by Randall & Beveridge (1946); during further work designed to find the most efficacious method of treatment, it was observed that the stage of infection had an important bearing upon the curability of the disease.

Table I gives a summary of the results of treatment of 69 experimentally infected adult indigenous cattle. None of these cattle had suffered from trypanosomiasis prior to their subcutaneous inoculation with *T. congolense*-infected mouse blood. Two recently isolated strains were used throughout these experiments, namely "Buruli" and "Busimbi" strains, which had been maintained in Swiss white mice by serial passage at acme.* (Browning & Calver.) Both are virulent strains. The level of dose varied from 0·8 mg./kg. to 1·5 mg./kg. in single injection, and from 0·2 mg./kg. repeated four times at weekly intervals to 0·8 mg./kg. repeated after 14 days. In view of the toxic effects resulting from treatment with the drug above this range of dose, no cattle treated at higher doses have been included in the table.

* Strain maintained by transfer of the trypanosome to fresh animals as soon as the parasites become abundant in the blood.

TABLE I

No. of cattle	Trypanosome strain	Dose of No. 1553 in mg./kg.	Point of treatment. Days after infection	Result	Relapse point. Days after treatment	No. of daily blood examinations after treatment
2	Busimbi	1·0	0•	2 R	65 and 83	—
1	"	1·0	2	1 R	71	—
1	"	1·0	4	1 R	85	—
1	"	1·0	6	1 C	—	102
1	"	1·0	8	1 R	34	—
8	"	1·6••	15	6 C 2 R	21 and 28	106
1	"	1·0	24	1 C	—	98
2	"	1·0	30	2 C	—	99
1	"	1·25	30	1 C	—	67
3	"	1·5	30	3 C	—	67
4	"	1·0	33	3 C 1 R	42	99
1	"	0·8	38	1 C	—	66
2	Buruli	0·8	52	2 C	—	109
6	Busimbi	0·8•••	52	6 C	—	98
6	"	0·8••••	52	6 C	—	98
4	Buruli	0·9	52	4 C	—	109
2	"	1·0	52	2 C	—	109
6	Busimbi	1·6••	52	6 C	—	98
8	Buruli	1·0	80	8 C	—	120
7	"	1·5	80	7 C	—	120
2	Busimbi	1·0	117	2 C	—	130
69						

R — Relapse. C — Cure.

Criteria of cure: Following daily negative examinations of stained thick blood film, negative subinoculations into susceptible calves were made, and the animals were paddocked, weighed weekly, and were kept under clinical observation for several months.

• Treated immediately following infection.

•• Aggregate dose, 0·8 mg./kg. repeated after 14 days.

••• Aggregate dose, 0·4 mg./kg., repeated after 7 days.

•••• Aggregate dose, 0·2 mg./kg., repeated four times at weekly intervals.

Discussion

Hornby *et al.* (1943) in assessing the results of treatment of *T. congolense* infections of cattle with phenanthridinium 897, noted that of 15 experimentally infected cases, the three relapse cases were all treated early, five weeks or less after inoculation. Browning & Calver (1943) working with mice and using two strains of *T. congolense* found that both strains responded more readily to treatment with phenanthridinium 897 at acme than at the pre-acme stage. This led to the suggestion that "an immunity reaction plays a significant part in conducing to cure." With both strains the pre-acme stage was more readily curable than the chronic stage of the disease. Strain I responded much better to treatment than Strain II, and it was observed that "under field conditions therapeutic results may vary according to the particular strain of *T. congolense*, and depend upon the stage of infection in the individual animal, as well as the rate at which the infection has been passed through a series of natural transmitters."

The curative value of phenanthridinium 1553 appears to be higher than that of phenanthridinium 897. Bell (1945) gave the minimum curative dose of No. 1553 for indigenous zebu cattle as 0·8 mg./kg., treatment being administered at a point where the animals used on the experiment were all "showing the normal signs of *T. congolense* infection, *i.e.*, loss of condition, marked diminution in red cell count, and the presence of numerous trypanosomes in the peripheral blood." In previous work, however, Carmichael & Bell (1945) noted four relapses out of 20 cattle treated with No. 1553 at 2 mg./kg., the drug being administered when the animals "were showing marked symptoms of *T. congolense* infection." A further 19 infected cattle were treated with No. 1553 at doses varying from 1 mg./kg. to 2 mg./kg., and all were cured. The four relapses noted above are contrary to all our results obtained on treatment of *T. congolense* infections of indigenous cattle, when the disease is well established.

It will be seen from Table I that all the relapses occurred following treatment during the early stages of the disease. Treatment of 26 cases within six weeks of infection gave eight relapses; the remaining 43 cases treated after six weeks' duration of the disease were all cured. These results are statistically very highly significant.

Since the drug is much more effective when given after the disease is well established than during the early stages, it is probable that immunity reactions play an essential part in assisting its action. This contention is perhaps more strongly supported by an analysis of results obtained from treatment during the first six weeks following infection, since it might be argued that after six weeks of the disease the probability of spontaneous recovery without drug treatment is greater. Of six cases treated during incubation, or before trypanosomes became numerous in the peripheral blood, *i.e.*, first to eighth day after infection, only one animal was cured; treatment of 20 cases between the 15th and 38th day after infection gave 17 cures. These results are statistically significant. The fact that the therapeutic response is greater when the disease is well established is at variance with accepted principles of treatment of infections caused by the polymorphic trypanosomes, where the earlier the treatment the more favourable is the prognosis.

The assumption that immunity reactions are essential in assisting the action of the drug would explain the higher minimum curative dose of 1·25 mg./kg. of No. 1553 recorded by Barnett (1946) for grade cattle, which would be expected to develop a lower immunity response than would indigenous zebu cattle.

In comparing the above results with those obtained by Browning & Calver, the question arises as to what extent the reactions of strains of *T. congolense* in cattle are analogous to the reactions of trypanosome strains in mice. During the early stages of the disease in both infections, treatment is more effective when trypanosomes have become abundant in the peripheral blood than when they are scanty, the greater immunity response occurring when abundant

parasites have been destroyed. From our observations, the peak period of trypanosomal activity in infections of cattle, using the Busimbi strain, occurs about the twelfth day after subinoculation of infected blood. During the eight days following that period trypanosome numbers fall rapidly, and a prolonged phase of low parasitaemia develops, which continues until death, or until the animal begins to throw off the infection spontaneously. Sudden increases in trypanosome numbers, which may occasionally occur, are considered to be due to variations in host resistance. Presumably the peak period at the twelfth day would correspond to acme in mouse infections, at which point in mice the infection is most readily curable. In the case of infections of cattle, however, it is not until later that treatment with phenanthridinium 1553 has its optimum effect; the increased anaemia and weakness resulting from several weeks' duration of the disease appears to be more than compensated by the consequent development of antibodies (Hornby *et al.*, 1943).

The curability of long-standing cases of *T. congolense* in cattle has not been assessed adequately, owing to the difficulty of obtaining material for test under laboratory conditions. An infection can scarcely be considered "chronic" in the true sense of the word until the animal has passed through the "anaemic" crisis described by Fiennes *et al.* (1946) as occurring as a "prolonged crisis period" at the eighth to twelfth week of infection. Table I gives 17 cases which might be considered chronic; all of these were cured, and in the case of the two animals treated 117 days after infection, haemoglobin and cell volume had returned to within the normal range three months after treatment. These results are in contrast to those obtained by Browning & Calver, who showed that for mouse infections the chronic stage was the most refractory to treatment, owing to "immunological changes which occur in trypanosomes with duration of the infection." It would appear from these few cases where treatment was much delayed that the reactions of trypanosome strains in the chronic stage in cattle are not analogous to those in the chronic stage in mice.

Failures of Therapeutic Response

Hornby *et al.* (1943) noted that relapsed infections of *T. congolense* in cattle following treatment with phenanthridinium 897, might be resistant to further treatment with the drug, but that this did not prevent subsequent successful treatment with other drugs. Carmichael & Bell (1944b) also recorded relapse cases which failed to respond to further treatment with phenanthridinium 897, and noted that the trypanosomes in these refractory cases appeared to have become drug fast. Calver (1945), however, after repeated unsuccessful attempts by standard methods to induce true drug resistance in *T. congolense* strains in mice, concluded that resistant strains were not easy to produce, and on the analogy of mouse infections, attributed the resistance to phenanthridinium 897 recorded by Hornby *et al.* and by Carmichael & Bell to be due to the chronicity of the infection rather than to the acquisition of specific drug fastness.

Of the eight relapse cases recorded in Table I, two responded to further treatment with phenanthridinium 1553 at 1 mg./kg., one died following an acute flare up of the infection, and details of the remaining five animals are recorded in the following tables.

In the case of B.5308 and B.5468, details of which are recorded in Table II, an attempt was made to develop drug resistant strains of *T. congolense* by the method of treating relapses with subcurative doses of phenanthridinium 1553. These two cattle had received No. 1553 at 1 mg./kg. immediately after infection, and became positive to blood examination after 65 and 83 days respectively (normal incubation period is six to eight days). Two treatments at 0·5 mg./kg. were given, followed by administration of the drug at a therapeutic dose of 1 mg./kg. Subinoculations into susceptible healthy cattle were made after the relapse to this dose, and further treatment with phenanthridinium 897 at 2 mg./kg. failed to clear the infection.

Table II

B.5308			
1946	Feb.	12th.	Subinoculated with *T. congolense*, Busimbi strain, *ex* mice.
	"	12th.	1·0 mg./kg. No. 1553.
	April	18th.	*T. congolense* positive.
	May	17th.	0·5 mg./kg. No. 1553.
	"	19th.	*T. congolense* negative (48 hours).
	"	28th.	Relapsed (11th day after treatment).
	"	31st.	0·5 mg./kg. No. 1553.
	June	2nd.	*T. congolense* negative (48 hours).
	"	11th.	Relapsed (11th day after treatment).
	"	15th.	1·0 mg./kg. No. 1553.
	"	17th.	*T. congolense* negative (24 hours).
	"	29th.	Relapsed (14th day after treatment).
	•July	26th.	Citrated blood subinoculated into B.5504 and B.5510.
	Aug.	6th.	2·0 mg./kg. No. 897.
	"	7th.	*T. congolense* negative (24 hours).
	"	19th.	Relapsed (13th day after treatment).
	"	26th.	*T. congolense* negative.
	Sept.	4th.	Relapsed.
	"	9th.	*T. congolense* negative.
	"	23rd.	Relapsed.
	"	26th.	*T. congolense* negative.
	Oct.	24th.	Relapsed.
	"	26th.	*T. congolense* negative.
	"	31st.	Relapsed.
	Nov.	1st.	*T. congolense* negative. ••
B.5468			
1946	Feb.	12th.	Subinoculated with *T. congolense*, Busimbi strain, *ex* mice.
	"	12th.	1·0 mg./kg. No. 1553.
	May	6th.	*T. congolense* positive.
	"	17th.	0·5 mg./kg. No. 1553.
	"	19th.	*T. congolense* negative (48 hours).
	"	27th.	Relapsed (10th day after treatment).
	"	31st.	0·5 mg./kg. No. 1553.
	June	2nd.	*T. congolense* negative (48 hours).
	"	6th.	Relapsed (6th day after treatment).
	"	15th.	1·0 mg./kg. No. 1553.
	"	28th.	Relapsed (13th day after treatment).
	•July	19th.	Citrated blood subinoculated into B.5483 and B.5445.
	"	30th.	2·0 mg./kg. No. 897.
	"	31st.	*T. congolense* negative (24 hours).
	Aug.	14th.	Relapsed (15th day after treatment).
	"	20th.	*T. congolense* negative.
	Sept.	3rd.	Relapsed.
	"	5th.	*T. congolense* negative.
	"	23rd.	Relapsed.
	"	25th.	*T. congolense* negative. ••

•• Daily examinations of stained blood film were continued until December 31st, 1946, and were constantly negative. In both cases the infection appears to have been thrown off spontaneously.

Table III gives details of B.5294, which showed similar responses to those of B.5308 and B.5468, following subcurative doses of No. 1553 after the original relapse to a dose of 1 mg./kg. No subinoculations were made from this animal. Final treatment with a course of stibophen eliminated trypanosomes from the peripheral blood, and three months later the animal was still negative to blood examinations.

Table III

B.5294			
1946	Feb.	12th.	Subinoculated with *T. congolense*, Busimbi strain, *ex* mice.
	"	19th.	*T. congolense* positive.
	"	20th.	1 mg/kg. No. 1553.
	"	22nd.	*T. congolense* negative (48 hours).
	Mar.	26th.	Relapsed (34th day after treatment).
	May	17th.	0·5 mg./kg. No. 1553.
	"	19th.	*T. congolense* negative (48 hours).
	"	28th.	Relapsed (11 days after treatment).
	"	31st.	0·5 mg./kg. No. 1553.
	June	1st.	*T. congolense* negative (24 hours).
	"	11th.	Relapsed (11th day after treatment).
	"	15th.	1·0 mg./kg. No. 1553.
	"	17th.	*T. congolense* negative (48 hours).
	"	26th.	Relapsed (11th day after treatment).
	July	23rd.	1·0 mg./kg. No. 1553.
	"	25th.	*T. congolense* negative (48 hours).
	Aug.	12th.	Relapsed (20th day after treatment).
	Oct.	8th.	Treated with Stibophen
	"	16th.	" " "
	"	24th.	" " "

Examinations, continued until January 7th, 1947, were constantly negative.

Table IV gives the histories of two relapse cases which occurred in a group of eight animals, which were treated 15 days after infection with a dose of 0·8 mg./kg. No. 1553, repeated 14 days later. In the case of B.5277 only a slight therapeutic effect was observed following the third treatment with No. 1553 at 0·8 mg./kg., trypanosomes being eliminated from the blood after 96 hours and reappearing two days later. B.5276 died on December 20th; the *post-mortem* picture was one of chronic trypanosomiasis, together with some evidence of liver damage resulting from toxic effects of drug treatment. Routine *post-mortem* smears were negative for trypanosomes. B.5277 was still negative to blood examination on January 7th, 1947.

Table IV

B.5276			
1946	June	25th.	Subinoculated with *T. congolense*, Busimbi strain, *ex* mice.
	July	2nd.	*T. congolense* positive.
	"	10th.	0·8 mg./kg. No. 1553.
	"	13th.	*T. congolense* negative (72 hours).
	"	24th.	0·8 mg./kg. No. 1553.
	Aug.	7th.	Relapsed (14th day after the second treatment).
	"	16th.	0·8 mg./kg. No. 1553.
	"	27th.	Relapsed (15th day after treatment).
	Sept.	13th.	1·0 mg./kg. No. 1553.
	"	17th.	*T. congolense* negative (96 hours).
	Oct.	8th.	Treated with Stibophen.
	"	15th.	" " "
	"	22nd.	" " "
			Daily blood examinations constantly negative.
	Dec.	20th.	*Died.* Subinoculation of citrated blood into a susceptible calf, prior to death, was negative.
B.5277			
1946	June	25th.	Subinoculated with *T. congolense*, Busimbi strain, *ex* mice.
	July	3rd.	*T. congolense* positive.
	"	10th.	0·8 mg./kg. No. 1553.
	"	13th.	*T. congolense* negative (72 hours).
	"	24th.	0·8 mg./kg. No. 1553.
	Aug.	1st.	Relapsed (7th day after second treatment).
	"	14th.	0·8 mg./kg. No. 1553.

Aug. 18th. *T. congolense* negative (96 hours).
" 20th. Relapsed (6th day after treatment).
Sept. 10th. 1·0 mg./kg. No. 1553.
" 12th. *T. congolense* negative (48 hours).
Oct. 8th. Treated with Stibophen.
" 15th. " " "
" 24th. " " "
Daily blood examinations, continued until January 7th, 1947, were constantly negative.

Details of four cattle subinoculated from B.5308 and B.5468 (Table II) are given in Table V. In all four cases there was a marked decrease in response to both phenanthridinium 1553 and No. 897 at therapeutic level, relapses occurring soon after treatment with both drugs. B.5483 failed completely to respond to treatment with No. 1553 at 1 mg./kg., and trypanosomes were not eliminated from the blood until after 120 hours following administration of phenanthridinium 897 at 2 mg./kg.; this animal relapsed again four days later. B.5510 and B.5445 responded within 24 hours to treatment with stibophen, both animals continuing consistently negative to daily blood examinations for a period of three months in the case of B 5510, and until death in the case of B.5445. In the latter animal, the *post-mortem* picture was similar to that of B.5276, *i.e.*, lesions of chronic trypanosomiasis, together with evidence of liver damage due to drug treatment.

TABLE V

B.5504
1946 July 26th. Subinoculated *ex* B.5308.
Aug. 2nd. *T. congolense* positive.
" 19th. 1·0 mg./kg. No. 1553.
" 22nd. *T. congolense* negative (72 hours).
" 28th. Relapsed (9th day after treatment).
Sept. 19th. *T. congolense* negative.
" 30th. Relapsed.
Oct. 7th. 2·0 mg./kg. No. 897.
" 8th. *T. congolense* negative (24 hours).
" 24th. Relapsed (17th day after treatment).
" 31st. *T. congolense* negative.
Nov. 5th. Relapsed.
" 13th. *T. congolense* negative.
" 27th. Relapsed.
Dec. 3rd. *T. congolense* negative.
" 12th. Relapsed.
" 13th. Treated with Stibophen.
" 14th. *T. congolense* negative.
" 17th. *Died.*

B.5510
1946 July 26th. Subinoculated *ex* B.5308.
Aug. 2nd. *T. congolense* positive.
" 19th. 1·0 mg./kg. No. 1553.
" 21st. *T. congolense* negative (48 hours).
" 29th. Relapsed (10th day after treatment).
Sept. 17th. 2·0 mg./kg. No. 897.
" 22nd. *T. congolense* negative (120 hours).
" 26th. Relapsed (9th day after treatment).
" 28th. Treated with Stibophen.
" 30th. *T. congolense* negative.
Oct. 5th. Treated with Stibophen.
" 12th. " " "
" 19th. " " "
Daily blood examinations, continued until December 31st, 1946, were constantly negative.

B.5483
1946 July 19th. Subinoculated *ex* B.5468.
" 27th. *T. congolense* positive.
Aug. 14th. 1·0 mg./kg. No. 1553.
" * No response to treatment.
Sept. 5th. 2·0 mg./kg. No. 897.
" 10th. *T. congolense* negative (120 hours).
" 14th. Relapsed (9th day after treatment).
" 19th. *Died.*
* No attempt was made to estimate trypanosome numbers.

B.5445
1946 July 19th. Subinoculated *ex* B.5468.
" 27th. *T. congolense* positive.
Aug. 14th. 1·0 mg./kg. No. 1553.
" 18th. *T. congolense* negative (96 hours).
" 22nd. Relapsed (8th day after treatment).
Sept. 5th. 2·0 mg./kg. No. 897.
" 7th. *T. congolense* negative (48 hours).
" 16th. Relapsed (11th day after treatment).
" 28th. Treated with Stibophen.
" 29th. *T. congolense* negative.
Oct. 5th. Treated with Stibophen.
" 12th. " " "
" 19th. " " "
Dec. 5th. *Died.* Daily blood examinations, continued until death, were constantly negative.

On the evidence recorded above it seems probable that these strains of *T. congolense* had in fact acquired specific drug fastness to phenanthridinium 1553 and, in the case of B.5308, B.5468, and the four cattle subinoculated from them, to No. 897 as well. Whilst Calver has shown that chronic infections in mice due to trypanosomes which have never previously been subjected to the drug may be extremely refractory to treatment, we have not been able to show similar lack of therapeutic response in the infections of 17 cattle which might be considered chronic (Table I). If the lack of response to the drug were due to a change in immunizing properties of the trypanosome strain, then it would be reasonable to suppose that there would be an equal lack of response to other trypanocidal drugs. In fact, all cases treated with stibophen showed immediate response to the drug.

Field Application

According to our general experiences in the field, of which the experimental animals in Table I serve as an example, phenanthridinium 1553 is the most valuable drug at present available for the treatment of *T. congolense* infection in cattle. Special attention should be paid to two points. Firstly, the disease must not be treated at too early a stage, since the fully developed infection is essential for the occurrence of the immunity response with this trypanosome, which appears to be of great importance in conducing to cure. Secondly, care must be taken that dosage of the drug, while adequate, does not exceed the toxic limit. In Uganda it has been found that a single dose of 1·0 to 1·5 mg./kg. is very highly effective in treatment of fully developed infections, and is unlikely to give rise to photosensitization or troublesome local lesions.

It is, however, clear that mass treatment with phenanthridinium 1553 cannot be expected to eliminate *T. congolense* from infected herds. Whilst cure can be expected in the majority of cases, relapses will occur following treatment of early cases of the disease. These relapsed infections may not respond to further treatment with the phenanthridinium drugs. Since it has been shown that resistant strains on subinoculation into other cattle do not respond to either phenanthridinium 1553 or No. 897 at therapeutic level, relapsed infections may become a source of extreme danger, acting as reservoirs of an infection incurable by phenanthridinium. Whether a resistant strain of trypanosome retains its resistance following cyclical development in tsetse is not known. Attempts to pass the strain from B.5308 through *G. morsitans* unfortunately failed.

It is noted that infections which show this lack of therapeutic response to the phenanthridinium drugs respond readily to treatment with stibophen. This indicates a possible line for treatment in the field, should another trypanocidal drug as valuable as phenanthridinium 1553 be found.

Summary

(i) The results of treatment with phenanthridinium 1553 of 69 cases of *T. congolense* infections of cattle at various stages of the disease are recorded. The drug was much more effective when given after the disease was well established than during the early stages, indicating that immunity reactions probably play an essential part in assisting the action of the drug.

(ii) Failures of response both to phenanthridinium 1553 and to No. 897 at therapeutic level are recorded, following attempts to develop specific drug fastness by the method of treating relapses with subcurative doses of No. 1553. In these cases the trypanosome strains maintained their resistance to drug treatment after subinoculation into other cattle. In all cases where the infection did not respond to the phenanthridinium drugs, subsequent treatment with stibophen resulted in immediate response.

(iii) It is concluded that treatment, or repeated treatments, with phenanthridinium 1553, of all animals in infected herds is unlikely to result in complete elimination of trypanosomiasis, owing to the relatively high relapse rate following administration of the drug during the early stages of the disease. The possibility of relapsed infections creating reservoirs of trypanosome strains incurable by phenanthridinium might render a policy of mass treatment extremely dangerous.

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Weekly Wisdom

It is idiotic to give education a high priority and then to deprive teachers and pupils alike of basic and supplementary text-books upon which the whole structure of education depends.—"New Statesman and Nation."

A Further Note on the Toxicity of Phenanthridinium 1553 for Cattle

By

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In a previous communication (Randall & Beveridge, 1946) it was recorded that phenanthridinium 1553, administered at a dose of 2 mg./kg. was too toxic for general field use in Uganda. Mention was made of early field trials in which the drug was administered at that dosage subcutaneously to 147 cattle, nearly all of which subsequently developed symptoms of photosensitization, and 41 of them died from the toxic effects of the drug treatment. An account was also given of the symptoms and gross pathology of the condition in the cattle.

It had been intended to incorporate the following records in an account of the histo-pathology of animals which had died from phenanthridinium poisoning. Since Fiennes (1946) casts doubt upon the reliability of the preliminary field trials, and upon subsequent laboratory work undertaken as a result of toxic effects observed in the field, it has been decided to publish full details of animals treated with phenanthridinium 1553 at accurately computed toxic doses under laboratory conditions.

Bell (1945) who carried out toxicity trials on mature zebu cattle using phenanthridinium 1553 intravenously at doses ranging from 3 to 6 mg./kg., reported photosensitization as occurring in *all* the cattle six weeks after administration of the drug. It should be noted that, of the 13 cattle treated, the animal which received 3 mg./kg. and two of the four which received 4 mg./kg. were the only survivors. The cattle used by Bell were animals which had been cured of experimental *T. congolense* infection by phenanthridinium 1553 in a previous experiment. Since there was reason to believe that cattle suffering from advanced trypanosomiasis would react more severely to the drug than would healthy cattle, it was decided to treat trypanosomiasis-infected cattle with the drug in a range of doses of from 2 to 5 mg./kg.

Toxicity Trial I

Eight mature zebu cattle, which had never previously had trypanosomiasis, were inoculated with *T. congolense*-infected mouse blood on December 29th, 1945. All were positive for *T. congolense* on January 6th, and were treated with phenanthridinium 1553 on January 25th, 1946. Details are shown in Table I.

Table I

	Weight	Dose of No. 1553 (25.1.46)	Volume of 2% sol. No. 1553	Date of commencement of generalized photosensitization	Result
			c.c.	March	
B.2122	(484 lb.) 220 kg.	2 mg./kg. s/c	22		Died on March 14th, 1946.
B.3824	(628 lb.) 285 kg.	2 mg./kg. i/m	28·5	15th	Slow recovery.
B.5073	(488 lb.) 221 kg.	3 mg./kg. s/c	33	18th	"
B.5086	(404 lb.) 183 kg.	3 mg./kg. i/m	27·5	15th	"
B.2161	(648 lb.) 294 kg.	4 mg./kg. s/c	59	18th	Died on April 9th, 1946.
B.1412	(510 lb.) 231 kg.	4 mg./kg. s/c	46		Died on March 12th, 1946.
B.4477	(632 lb.) 287 kg.	4 mg./kg. i/m	57	16th	Destroyed on April 2nd.
B.5071	(398 lb.) 181 kg.	5 mg./kg. s/c	45	8th	Destroyed on March 30th.

It will be noted that all animals developed generalized symptoms of photosensitization except B.2122 and B.1412, which died before generalized symptoms had time to develop. Both these cases, however, showed the customary lachrymation, glaucoma and nasal discharge typical of animals suffering from phenanthridinium 1553 poisoning. B.4477 and B.5071 were destroyed in a condition of extreme weakness and emaciation.

The weight records of these animals are striking, and are shown graphically in Fig. 1. (*See opposite page.*) For comparative purposes weight records are included of two animals, B.5491 and B.4870, which were treated 30 days after infection at 1·25 and 1·5 mg./kg. respectively. All animals on experiment were constantly negative to daily examinations of stained thick blood film following treatment; the survivors, after negative subinoculations into susceptible calves had been made four months after treatment, were discharged as cured.

Toxicity Trial II

Three healthy mature zebu cattle were given phenanthridinium 1553 at doses of 3, 4 and 5 mg./kg. respectively on March 28th, 1946, as shown in Table II.

Table II

	Weight	Dose of No. 1553 (28.3.46)	Volume of 2% sol. No. 1553	Result
B.5494	(540 lb.) 245 kg.	3 mg./kg. i/m	36·8 c.c.	Generalized symptoms of photosensitization commenced on May 9th. Animal recovered slowly.
B.5492	(508 lb.) 231 kg.	4 mg./kg. i/m	46·2 c.c.	Died on May 6th, 1946.
B.5092	(364 lb.) 166 kg.	5 mg./kg. i/m	41·4 c.c.	Died on May 13th, 1946.

The purpose of this test was to obtain material uncomplicated by trypanosomiasis lesions, for pathological examination. B.5092 was kept in a semi-darkened stable in order to ascertain whether symptoms of photosensitization would develop in the absence of direct sunlight. This animal died 46 days after administration of the drug; no skin lesions developed, although the animal showed the characteristic lachrymation and nasal discharge. B.5494 developed classical symptoms of photosensitization six weeks after administration of the drug at 3 mg./kg., recovering slowly afterwards. The condition of this animal ten weeks after administration of the drug is shown in Fig. 2.

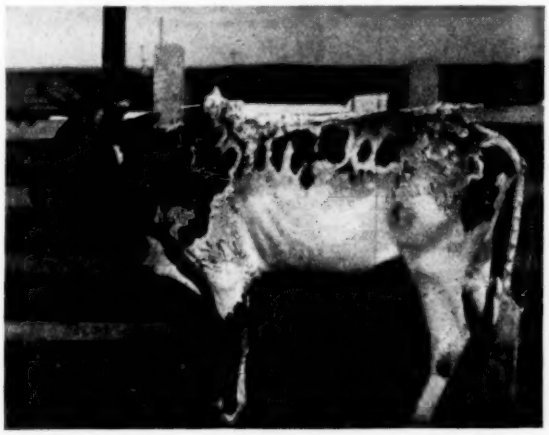

Figure 2.

B.5494, which received Phenanthridinium 1553 at 3 mgm./kilo., ten weeks after administration of the drug.

Weight records are shown graphically in Fig. 3 (*over-leaf*). A control animal, B.5274, which was paddocked together with B.5494 and B.5492, is included for comparative purposes.

Discussion

These results confirm the findings of the preliminary field trials that, in Uganda, phenanthridinium 1553 is unsafe for general use at a dose of 2 mg./kg. Details of the first field trials in 1945 in Uganda carried out by Cronly, are as follows:—

Trial I (2 mg./kg.). *Gombolola Mutuba* 5, *Bulemezi*.

Fifty-three cattle of the "Nganda" type (Ankole-Zebu cross) were treated for a mixed infection of *T. congolense* and *T. vivax* on August 21st, 1945. All cattle were confirmed positive by microscopical examination of wet blood prior to treatment. Phenanthridinium 1553 was used in 2 per cent. solution, and the average dose per animal was 21 c.c. given subcutaneously. Most of the cattle showed extensive lesions and general symptoms of photosensitization seven weeks after administration of the drug. Of the 53 cattle treated, 20 subsequently died.

Trial II (2 mg./kg.). *Gombolola Mutuba* 5, *Singo*.

Ninety-four Ankole cattle were treated for *T. congolense* infection on October 24th, 1945. All cattle were confirmed positive before treatment. Phenanthridinium 1553 was administered in 2 per cent. solution, both subcutaneously and intramuscularly; the average dose was 31 c.c. The majority of the cattle developed symptoms of photosensitization four weeks or more after treatment, and 21 of the 94 animals died.

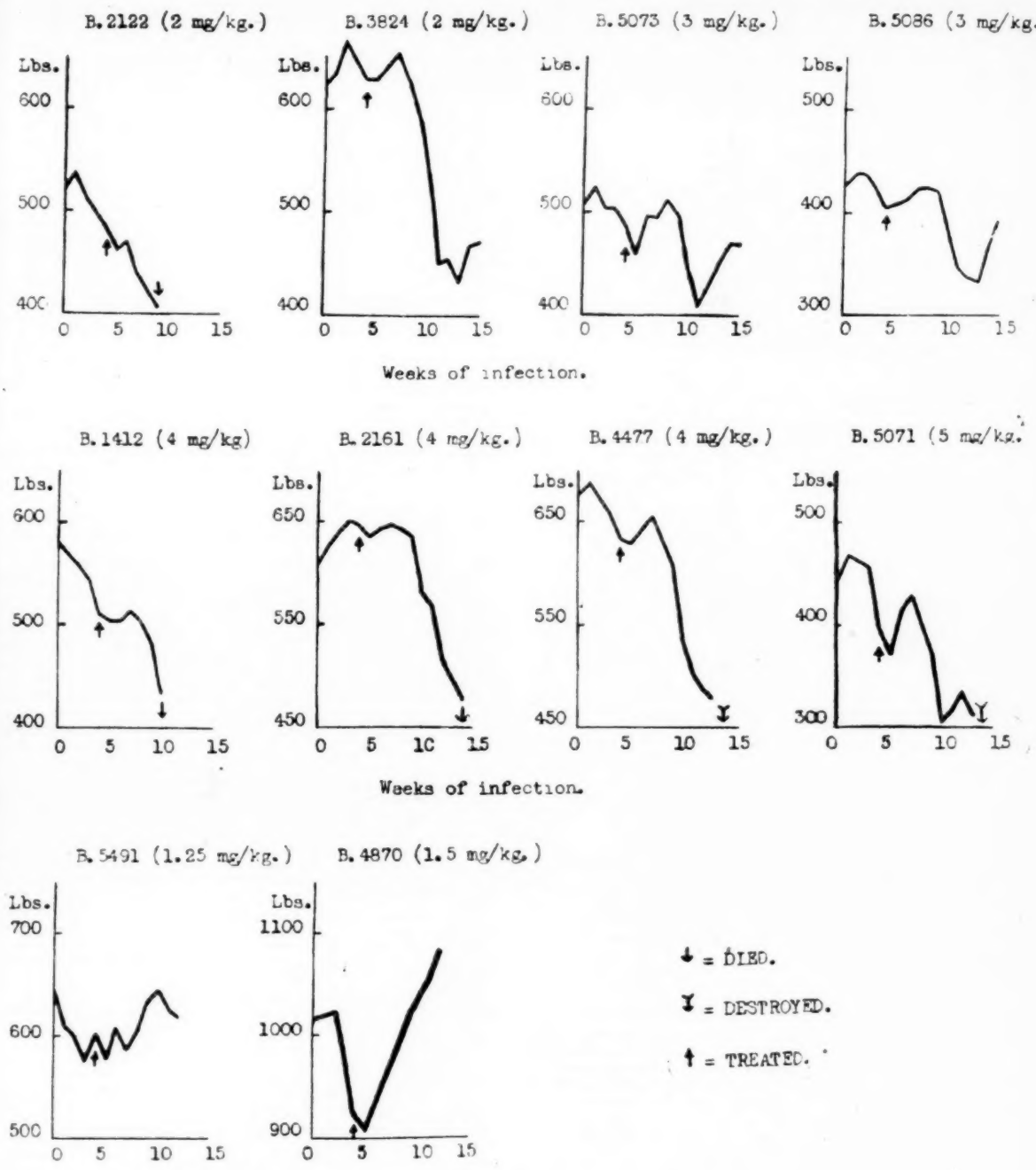

FIGURE 1.

In both trials severe local reactions, following subcutaneous administration of the drug, were of frequent occurrence. For many weeks after treatment and until some time after the survivors began to recover from photosensitization the general appearance of the treated animals was somewhat frightening. The effect this had on the primitive African stock owner and his neighbours is no doubt obvious, and needs no further comment except that much of their confidence in anti-trypanosomiasis work was lost, and was not easily regained.

The average dose of 21 c.c. 2 per cent. solution in Trial I is a correct dosage for administration of phenanthridinium 1553 at 2 mg./kg. for animals of 462 lb., and the average dose of 31 c.c. 2 per cent. solution in Trial II is correct for animals of 682 lb. The normal weight range of mature "Nganda" cattle is between 500 and 800 lb., and of Ankole cattle between 600 and 900 lb. There is therefore no possibility that the cattle in these trials were given "2 mg. per lb. instead of per kg." as suggested by Fiennes (*loc. cit.*). In Trial I the probability is that the cattle, on average, received rather less than 2 mg./kg.

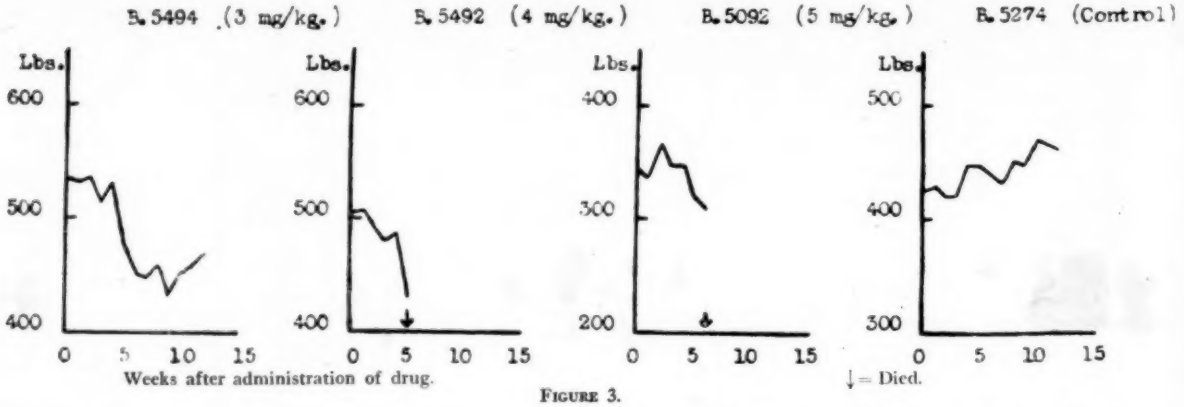

FIGURE 3.

It is obvious that the drug must be used with caution; the dose as now used in Uganda is 5 c.c. of a 1 per cent. solution per 100 lb., *i.e.*, 1·1 mg./kg., representing a 37·5 per cent. increase over the minimum curative dose for indigenous cattle given by Bell (1945) as 0·8 mg./kg. In treatment of *T. congolense* infections at that level of dose, *provided that* the drug is administered when the disease is well established, relapses should be of rare occurrence.

Acknowledgments are due to the Director of Veterinary Services, Uganda, for permission to publish this paper.

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CLINICAL COMMUNICATION

Marsupialization for Acute Pyometra in the Bitch

R. E. WILLIAMS, B.V.SC., M.R.C.V.S.
SOUTHAMPTON

The small-animal practitioner regularly finds himself confronted with cases of pyometra in the bitch in its terminal stages. Almost complete retention of the uterine contents has produced gross abdominal distension, vomiting has usually been persistent and severe for 12 to 36 hours, and since the various "gastric" medicines have failed to bring relief, the practitioner is summoned to an animal, acutely dehydrated, with some degree of toxaemia, producing a state of collapse which may be approaching coma.

Many such cases are destroyed annually because they constitute too poor a surgical risk for the customary total ovaro-hysterectomy to be performed, or die during the operation.

A highly successful operation has been devised in America, however, by which, under local anaesthesia, the uterus may be drained through the flank. This procedure is known as marsupialization of the uterus, and the spectacular response of even seriously collapsed and aged subjects need only be experienced to force conviction as to its merits.

On admission the most urgent clinical symptoms are dehydration, and the acute chloride loss attendant upon persistent vomiting. Warmth, and the frequent subcutaneous infusion of small amounts of glucose saline solution such as 150 c.c. to 200 c.c., for a few hours, are the first necessity. This period of comparative inactivity can be utilized by the practitioner to consider the possibility of complicating conditions which may prejudice the outcome. It is not uncommon to find in recurrent cases of pyometra, a coincident pyelonephritis which will lead to a fatal termination some days after a successful operation.

TECHNIQUE.—Premedication is carried out with morphine sulphate gr. ¼ with atropine, or if very collapsed, atropine gr. 1/60th alone. The animal is fixed in a lateral position on the operating table, and a central area of the flank three inches to four inches square is shaved and sterilized. The distended uterine horn is made to bulge subcutaneously at this point by placing a small sandbag or folded towel under the opposite flank thus forcing the abdominal contents upwards. The skin incision is made vertically about two inches long at the most prominent part. Anaesthesia of the skin at the site of incision is induced by local infiltration with 2½ per cent. procaine. The skin edges are moderately retracted with self-retaining retractors, and a corresponding line anaesthetized and incised through the muscle layers. When the peritoneum is penetrated, the uterine horn generally presents firmly in the incision, sealing it off effectively against the escape of other viscera. In any case this is readily achieved by manipulation of the pad under the dog.

The exposed ellipse of uterine wall is now secured to the margins of the outer muscle incision by five or six interrupted sutures. An eyeless, full-curved intestinal needle carrying No. 0 ten-day chromicized gut is essential for good results. Each suture is laid by passing the needle down through the muscle layer into the uterine lumen, taking a firm bite of about quarter of an inch of the uterine wall parallel to the edge of the muscle, returning up through the muscle layer, to be tied on the surface.

When the uterus has thus been firmly anchored to the abdominal muscles, a central puncture is made preferably with a thermo-cautery. The uterine contents may gush out, but occasionally very little escapes. The surrounding tissues should be thoroughly packed off for protection even though in most cases no active infection is present. A plain rubber drain is inserted and fixed in position by a single suture through the uterine wall. The drainage tube is easily made from a six-inch length of quarter-inch tubing, at one end of which several holes are snipped with curved scissors. The entire area is sprinkled with sterile sulphanilamide powder and covered with a thick gauze pad to absorb the drainings.

Subsequent treatment consists in changing the dressings twice daily. The entire uterine contents drain away in three or four days. As soon as the dressing remains reasonably clean the drainage tube may be removed, and the wound treated as an open wound. No attempt is made to suture the skin, and the muscle incision is usually obliterated by the time the drain is removed.

Following release of abdominal pressure, vomiting ceases at once, and within 24 hours the animal is usually ready to eat. A light diet and general supportive treatment enables the patient to be discharged within ten days. The skin fistula heals slowly in about 21 days.

Where there has been a history of trouble it is best to attempt to persuade the owner to have a total hysterectomy performed in about three months' time. In a long series of cases the uterus has always been found to be normal in appearance when subsequently removed, but if left *in situ* a percentage of recurrences occur. Some difficulty may be experienced in dealing with the adhesion between the uterus and the abdominal wall when the hysterectomy is performed, but a slightly longer abdominal incision giving better access to the area will usually overcome this difficulty.

In one exceptionally awkward case the adherent portion of the uterine horn was resected, the ends closed as in an enterectomy, and left in the abdomen with no subsequent trouble.

This operation is far simpler to perform than a hysterectomy, is almost 100 per cent. successful and enables a whole group of otherwise hopeless cases to be tackled. With the scales apparently so heavily weighted originally against the surgeon, the owner is usually correspondingly impressed and grateful.

Needless to say "open" cases of pyometra in which the discharge is profuse will derive no benefit from the operation.

ABSTRACTS

[**The Ecology of the Sheep Tick,** *Ixodes ricinus* **L. I—Some Further Aspects of Activity, Seasonal and Diurnal; II—The Infestations of Hill Sheep.** Milne, A. (1947.) *Parasitology.* **38.** 27-33 & 34-50.]

I.—The author has made a further study of the seasonal activity of *Ixodes ricinus* in Northumberland to determine whether activity times for any tick stages differ on different hosts. Weekly tick counts made on black-faced ewes, rabbits, skylarks, and meadow-pippets showed that the curves of tick activity on sheep were similar in form and timing to those for wild animals and birds. In general, adults and nymphs have similar and concurrent activity curves, but nymphs may occasionally have their peak two to three weeks later, whilst the larval peak is invariably several weeks later than the female peak. Counts obtained from blanket dragging at night showed that ticks are active during the hours of darkness. The activity density, however, is much less than in daylight, and seems to follow fairly closely the diurnal fluctuation in atmospheric temperature.

II.—Detailed examinations of hill sheep infested with *I. ricinus* have been made and the following observations resulted: Female ticks are found mainly on the hairy parts—head, ears, and legs; the 'bare' areas—axillary and inguinal regions; and certain woolly parts such as the short-woolled areas bordering the hairy and bare sites. They are not usually found below the carpal or tarsal joints, or on the long-woolled withers, back, rump, or flank. More female ticks are found on the head than on the axilla, and more on the axilla than on the inguinal region, simply because in walking, the head of the sheep offers the first chance to ticks to become attached. Each tick stage tends to attach in different zones of the same region; the larger the stages the further the attachment site from their point of arrival. This may be associated with variations in friction, or it may be that the larger ticks need more stimulation to attach than smaller ones, and so travel farther from their point of arrival. On a hill farm in Northumberland, where the peak of female activity is in spring, the average numbers of females found per annum on ewes, hoggs, and lambs is in the ratio of 8:6:1, these figures probably being dependent upon the size of the host. On this and other hill farms in the same area the highest weekly count per ewe is about 100 to 150 female ticks, while the extreme upper limit of individual range is about 300, and a ewe feeds about five times as many ticks in a spring season as she carries during the peak week. On heavily infested land, carrying one sheep per one to five acres, typical flocks feed from 100 to 600 female ticks per acre per annum. The most heavily stocked pastures result in the highest tick density. About eight times as many nymphs as females are fed by sheep per annum. Tick infestation is lower on sheep in good condition, such animals apparently having greasier fleece and less extensive bare areas than those in poor condition. In any age groups there is a tendency for sheep to show consistent differences in the weights of infestation, but each individual usually keeps to the same rank of infestation. Those animals which show a marked difference in infestation weight show little difference in the majority of the physical, chemical, and physiological characters of body form and body surface, such as *p*H and yolk content of wool, body dimensions, grease and suint content of the wool, with the exception that less infested sheep have coarser fleece hair and less fleece clearance from the ground. It would seem that the amount of ground covered in unit time is the chief factor in determining the weight of infestation.

M. L. B.

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[**The Seasonal Activity of the Tick,** *Ixodes ricinus* **L., in Wales.** Edwards, E. E., & Arthur, D. R. (1947.) *Parasitology.* **38.** 72-85.]

A survey was made, over a period of two years, of the activity of *Ixodes ricinus* on both hill and lowland grazings in Wales. On farm grazings in Glamorgan it was found that there are usually two periods of female tick activity, one in spring and the other in autumn. The peak of activity curves in both nymphs and adults is similar, but the adults remain active for a longer period than the nymphs. The peak of larval clusters occurs at least three weeks later than that of the female activity.

With regard to tick activity on cattle in South Wales, a spring and autumn peak was noted, but in mid-Wales there appeared to be a single summer peak. The period of engorgement varied from seven to 13 days and was not associated with the breed of cattle. Also, there seemed to be no significant difference in the susceptibility to attack of six different breeds under examination, and no correlation between tick infestation and the reproductive condition of the host. Sheep seemed to be relatively insusceptible to infestation, while the peak of activity on horses corresponded closely to that recorded on cattle.

M. L. B.

Questions and Answers

The submission of questions for inclusion in this column will be welcomed: they can relate to any aspect of veterinary work. For purposes of record, each question is numbered, and those submitting questions are required to furnish (not for publication) name and address.

Answers to readers' queries represent exclusively the personal opinions of the writers, and criticism of the replies will be appreciated.

All communications should be addressed to the Editor.

Toxaemia of Pregnancy

Q. CC.—*Ewes suffering from toxaemia of pregnancy ("twin-lamb disease") seem frequently to recover after lambing or abortion. Is it considered that stilboestrol therapy would be of use in the treatment of the condition?*

A.—Abortion in sheep can often be induced by injections of 125 mg. stilboestrol but sheep suffering from pregnancy toxaemia do not usually recover when abortion is induced in this way, without any other treatment. Clark *et al.* (1943) (*Onderstepoort J.* **18.** 263-278) claimed that treatment should be directed to produce purgation and recommended the subcutaneous injection of 1 mgm. lentin together with intravenous injections of 10 grammes glucose and 333 i.u. thiamin hydrochloride.

It is possible that induction of abortion by stilboestrol therapy might be a useful supplement to such treatment, but, by itself, the induction of abortion is relatively ineffective.

Many observers claim that forced exercise of the flock is of value in checking an outbreak of the disease.

* * * * *

Sulphanilamide as a Treatment for Foot-Rot in Sheep

Q. CCI.—*Is sulphanilamide a specific treatment for foot-rot in sheep?*

A.—*Fusiformis necrophorus,* the chief organism associated with foot-rot, is certainly sensitive to sulphapyridine, which drug has proved valuable in the treatment of the corresponding disease in cattle (foul of the foot). It may be regarded as a specific for this organism but its use can hardly be regarded as a practical proposition in sheep. Remarkable results are recorded by Forman* in cattle using single intravenous injections of 60 grammes of sodium sulphathalidine, dissolved in 500 c.c. of distilled water. This proved to be a safe dose in the case of Channel Island heifers or cows ranging in weight from 500 to 1,000 lb. From this it would seem that sheep might be treated in the same way with about 15 grammes in 150 c.c.; though the intravenous route is not likely to be so practicable if a large number are to be treated.

The Australian work on foot-rot, using 5 per cent. copper sulphate in a foot bath, is worth mentioning, since the expense of sulphonamide therapy in a large flock may be uneconomic. The foot baths are shallow pans which can be flooded with the solution and accommodate 100 or more standing sheep at a time. The whole essence of the treatment is that the animals shall remain for *an hour* in the foot bath (the short time interval being the chief reason why foot baths in this country have proved so ineffective).

The writer, himself, has achieved the cure of a flock very severely affected with "lour" by adapting an old byre, flooding it with the copper sulphate solution and allowing the flock to stand inside for the approved time.

* *J.A.V.M.A.* Vol. CIX. August, 1946. Number 833.

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Emphysema of Subcutaneous Tissues in Pneumonia

Q. CCII.—*Recently, in a case of bovine pneumonia, the cow's subcutaneous tissues along the loins, back, and base of the neck, were infused with air, and the crepitation observed on manipulation was most appreciable. I find this to be a rare condition, but should like to know the cause.*

A.—The cause is a defect in the lung tissue which, in the case cited, is most likely to have been rupture of alveoli as the result of coughing. Air could then be sucked or forced into the interstitial tissue and give rise to widespread emphysema of the lung. The pressure exerted by this on surrounding alveoli would set up dyspnoea and serve to aggravate the process. The air accumulating around the hilus of the lung would get into the mediastinum, make its way, through the entrance to the chest, to the subcutaneous tissue at the base of the neck and become widely distributed over the body.

QUESTIONS IN PARLIAMENT

Motor Cars (Veterinary Surgeons)

Mr. Renton asked the Minister of Supply whether after consultation with the Minister of Agriculture he will arrange for motor cars to be issued to veterinary surgeons in accordance with the scheme whereby the motor industry has given an undertaking to give priority to the delivery of motor cars required by certain other specified users.

Mr. Woodburn: No, Sir.

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Artificial Insemination (Livestock Losses Replacement)

Mr. Price-White asked the Minister of Agriculture whether consideration has been given to the use of artificial insemination as a means of assisting the agricultural industry in connection with the heavy losses of stock caused by abnormal weather conditions; and what is the opinion of his advisers as to the efficacy of such a method of assistance for farmers concerned.

Mr. T. Williams: While I have great hopes that artificial insemination will be a most valuable and growing factor in the improvement and maintenance of the quality of our livestock, and particularly of our dairy stock, this system of breeding does not, unfortunately, offer the same advantages in the field of numerical increase, which is the main requirement to replace losses sustained last winter. A high percentage of such losses occurred among flocks of hill sheep for the breeding of which artificial insemination cannot readly be used.

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Hill Sheep

Sir Ian Fraser asked the Minister of Agriculture if, where hill farmers have lost sheep and suffered deterioration in their flocks through malnutrition, he will introduce a scheme for the provision of extra coupons for all stock during the summer months to aid their recovery.

Mr. T. Williams: Although it may be necessary in exceptional circumstances, when they are brought down from the hills in severe weather or for lambing, the feeding of concentrates to hill sheep is not a usual practice and such feeding would be detrimental to the characteristics of the flocks. Moreover, it would be impracticable to take such feeds to the ewes when they are on the hills.

Sir I. Fraser: As it is almost impossible to find any way of helping these people practically, because we cannot give them back the sheep, will the Minister realize that he can help them materially by giving them every possible feeding-stuff for their stocks, not only sheep?

Mr. Williams: The hon. Gentleman must be aware that we have taken all the feeding-stuffs we could lay our hands on to the hills to help the hill farmers to feed their flocks and herds; and the hon. Gentleman must also be aware that hill sheep must be as nearly self-supporting as possible, otherwise their main purpose fails.

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Imported Poultry (Fowl Pest)

Lord Willoughby de Eresby asked the Minister of Agriculture whether, in view of the increasing number of cases of fowl pest in the United Kingdom and the seriousness of the disease, he has now decided to stop the import of poultry from countries where fowl pest is known to be, with a view to the early eradication of the disease in the United Kingdom.

Mr. T. Williams: The importation of live poultry and hatching eggs from countries where fowl pest is known to exist is not now being permitted. The question of further measures is under consideration.

Lord Willoughly de Eresby: In view of the fact that 90 cases of this disease have now been notified, that it is a very infectious disease and will have a very great effect on the poultry stock in this country, will the right hon. Gentleman also consider restricting the import of undressed carcases from those countries where it is known to exist, as veterinary surgeons think it is due to the feeding of offal to the poultry in this country?

Mr. Williams: I understand a prohibition on the importation of dead poultry would mean stopping the bulk of our supplies, and that would hardly be practicable with the present shortage. However, I can assure the hon. Member that we are at present in consultation with the poultry industry.

Lord Willoughby de Eresby: In view of the fact that the imports will or must continue, will the right hon. Gentleman first see that some instructions are issued that this offal should be boiled before being fed to poultry; and in future, when imports of poultry have to be made, will he see that they will be dressed and not undressed poultry?

Mr. Williams: Advice to boil all poultry waste before feeding to their birds has been "propaganded" amongst poultry-keepers, and we are going further in that direction, after consultation with the poultry industry.

Mr. Hurd: Would not it be better to stop the importation of table poultry from those countries where they have this disease, rather than having our own flocks decimated?

Mr. Williams: I have already stated that live poultry is not now being imported.

Mr. Hurd: Table poultry?

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Medical Vacancies

Mr. A. Lewis asked the Minister of Health how many local authorities make it a condition when advertising medical vacancies, that applicants should be members of their appropriate associations; and as such advertisements are refused by medical journals, if he will take steps, if necessary by legislation, to see that such local authorities are enabled to fill their vacancies with properly skilled persons.

Mr. Bevan: I do not know how many local authorities have sought to impose this condition, but I have sent my hon. Friend a copy of a circular which I have issued to all authorities on this subject.

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Dog Collars (Owner's Name and Address)

Mr. Janner asked the Secretary of State for the Home Department whether, in view of the lack of knowledge on the part of the public that dog collars should contain the name and address of the owner of the dog, he will consider putting a paragraph to this effect on the back of the dog licence since numberless dogs which are lost are either without a collar or have a collar without any identification.

Mr. Ede: I am looking into my hon. Friend's suggestion and will communicate with him as soon as I can.

NOTES AND NEWS

Diary of Events

May 10th.—Meeting of the Society of Women Veterinary Surgeons, at 69, Great Peter Street, London, S.W.1, 2 p.m.

May 12th.—Meeting of the Farmers' Club, Royal Empire Society, S.W.1, 5 p.m. [Mr. A. P. McDougall and Mr. Clyde Higgs: "Ley Farming and the Livestock Population."]

May 13th.—Scientific Meeting of the Zoological Society of London, Regent's Park, N.W., 5 p.m.

May 15th.—Annual Meeting of the Dumfries and Galloway Division, N.V.M.A., at Carlisle (Crown and Mitre Hotel), 11 a.m.

May 20th.—R.C.V.S. Council Election. Voting papers to be issued.

May 21st.—Spring Meeting of the Eastern Counties Division, N.V.M.A., at Bury St. Edmunds (Angel Hotel), 2.30 p.m.

May 23rd.—R.V.C. Students' Union Society Annual Ball, Grosvenor House, Park Lane, W., 8 p.m. to 1 a.m.

May 27th.—R.C.V.S. Council Election. Voting papers to be returned.

May 28th.—Annual Meeting of the West of Scotland Division, N.V.M.A., in the Glasgow Veterinary College, 2.15 p.m.

May 30th.—Meeting of the Royal Counties Division, N.V.M.A., at Oxford (Forum Restaurant), 2.30 p.m.

June 3rd.—R.C.V.S. Annual General Meeting.

June 3rd and 4th.—R.C.V.S. Committee Meetings.

June 5th.—R.C.V.S. Committee and Council Meetings.

June 13th.—R.A.V.C. Annual Dinner, Grosvenor House, London.

June 26th and 27th.—R.C.V.S. Written Examinations.

July 28th—Aug. 1st.—N.V.M.A. Annual Congress in Edinburgh.

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R.C.V.S. Council Election

Publication of Candidates' Addresses

The election addresses of candidates for Council, R.C.V.S., will be published in our issue of May 17th. Those who desire to submit such addresses for publication are requested to note that they must be received by the Editor of *The Veterinary Record*, 36, Gordon Square, London, W.C.1, not later than **Monday, May 12th**, and that they must be limited to 250 words.

New Appointments to the Staff of the Ministry of Agriculture

As notified in recent issues, Council, N.V.M.A., has decided that no advertisements for appointments to the veterinary staff of the Animal Health Division of the Ministry of Agriculture shall be accepted for *The Veterinary Record* pending the settlement, in a manner satisfactory to the Association, of the question of the status and salaries of the Veterinary Officers of the Division.

In the meantime, any members of the profession who may, nevertheless, contemplate applying for such posts, should these be advertised elsewhere, are requested first to communicate with the General Secretary of the Association at 36, Gordon Square, London, W.C.1.

* * * * *

Questionnaire to Divisions, N.V.M.A.

Will members of the Association, who have not already done so, kindly complete the questionnaires sent to them by their Divisional Secretaries, and return them without delay either to those deputed to collect these replies in their Divisions, or, if no special arrangements have been made, to the General Secretary, N.V.M.A., direct.

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His Majesty's Colonial Veterinary Service

Our readers will have seen the advertisements appearing under the above heading in our last and current issues. It will be noted that intending applicants can obtain full information regarding the Colonial Veterinary Service from the Director of Recruitment. If there should be any specific matters upon which they desire further information the General Secretary, N.V.M.A., will be glad to furnish it if possible.

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THE VETERINARY EDUCATIONAL TRUST

Sir Cleveland Fyfe Appointed Organising Secretary

The Veterinary Educational Trust announces that Sir Cleveland Fyfe, C.B.E., has been appointed its Organizing Secretary.

Sir Cleveland Fyfe was appointed General Secretary to the National Farmers' Union in 1932, having been first Parliamentary Secretary to that organization from 1919 until, in 1923, he was appointed joint General Secretary. A member of the National Milk Publicity Council (Chairman, 1936-37), he acted as Secretary *pro tem.* to the Milk Marketing Board on its inception, and as Secretary to the Marketing Boards Co-ordinating Committee. Sir Cleveland Fyfe's able and comprehensive service to agriculture and the N.F.U. has included the editorship of the Union's publications, while he was a member of the N.F.U. delegation which attended the first British Empire Producers' Conference, held at Sydney, N.S.W., in 1938, in connection with Australia's 150th Anniversary Celebrations.

In the current issue of its *News Sheet*, published on Tuesday last, the National Farmers' Union, in words with which we associate ourselves most warmly, welcomes Sir Cleveland Fyfe's appointment, saying that the Trust is fortunate in having secured his services and that the appointment indicates the importance which is attached to the development of veterinary research and the extent to which agriculture is involved in the plan for its expansion. Sir Cleveland, whilst continuing his service to agriculture, will, says the N.F.U., bring to bear on his new task the fruits of long experience and study of the industry's requirements.

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Infertility of Mares and Foal Mortality

IRISH RACING BOARD'S RESEARCH SCHOLARSHIP

We would commend to the attention of graduates qualified as candidates under the announced terms of the award, the notification by the Irish Racing Board, appearing on page vi of this issue, of a veterinary scholarship for the promotion of research into infertility of mares and mortality amongst foals. The three-year scholarship is a substantial one (£500, £600 and £800 a year, respectively) and we trust that this opportunity to pursue research in what—in its modern aspects—is virtually a virgin field of enquiry and one of great importance to both the thoroughbred and commercial horse industries will attract many suitable applicants, despite the Eire restrictions imposed. In this country, of course, there exists the Newmarket Equine Research Centre, which is developing its own programme, but those on both sides of the water are in close accord.

PERSONAL

Births.—BALLS.—On April 24th, 1947, to Isobel, wife of Donald Balls, M.R.C.V.S., of Dorking, a daughter (Annabel Christine).

BAXTER.—On May 3rd, 1947, to Rhoda, wife of J. D. Baxter, Compton Cottage, Daventry, Northants, a daughter, Sheina Marjorie; sister for Gavin.

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"*Freeman of the City.*"—Dr. W. R. Wooldridge, Scientific Director of the Veterinary Educational Trust and a Past-President of the N.V.M.A., has been elected a Member of the Worshipful Company of Farriers and becomes a Freeman of the City of London.

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Marriage.—CAMPBELL—BROOKS.—The marriage took place at Egloskerry Church, Cornwall, on April 25th, 1947, of John D. Campbell, M.R.C.V.S., of Launceston, Cornwall, and Dorothy Brooks, of Egloskerry Vicarage. The ceremony was performed by the Bishop of Truro and Bishop J. Holden. Mr. G. W. Serth, M.R.C.V.S., of Lincoln, was best man. The bridegroom and best man served in the R.A.V.C. together in the Middle East during the war.

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R.C.V.S. OBITUARY

MCCORKINDALE, James, M.R.C.V.S., D.V.S.M. Graduated Glasgow, July 17th, 1940. Died March 17th, 1947. Mr. Jas. McCorkindale joined the City of Birmingham Veterinary Department August 1st, 1946, on discharge from the Army after having served with R.A.V.C. in Burma.

MORPHEW, Harold: Roywood, Deepdene, Dorking, Surrey. Graduated London, December 20th, 1907. Died April 29th, 1947.

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The Horse Society of Great Britain

AMALGAMATION OF THE NATIONAL HORSE ASSOCIATION WITH THE INSTITUTE OF THE HORSE

The main business to come before the annual general meeting of the National Horse Association of Great Britain held on Monday, April 21st, was to consider suggestions for the amalgamation of this Association with the Institute of the Horse and Pony Club (Ltd.). Two Committees appointed respectively by the Councils of the Association and the Institute have been engaged during the greater part of the past year investigating the possibility and desirability of amalgamating the two organizations. Both the committees recently reported in favour of such an amalgamation and their reports were adopted unanimously by their respective Councils, which recommendation was approved at the meeting of the National Horse Association and of that of the Institute of the Horse held the same day. The name of the new body resulting from the amalgamation is to be "The Horse Society of Great Britain," and its objects will include those of the two bodies. Owing to the fact that the Institute of the Horse has to liquidate it will, however, be some little time before the two Societies become one. In order to get the new Society well established and in full working order, the first Council will hold office until the annual general meeting of 1951, after which the whole Council will resign and future Councils will include 30 members to be elected by members of the Society, one-third of them to retire each year. The new Society will be an incorporated body, the liability of each member being limited to £2. The minimum subscription is £1 per year for annual members, and £25 for life members. The Secretary of the new Society will be Mr. R. A. Brown.

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BRITISH MEDICAL ASSOCIATION

Dr. J. H. Bruce and Dr. John Revans, M.B.E., have been appointed Assistant Secretaries to the British Medical Association. Dr. Bruce took his M.B. Glasg. in 1937. Dr. Revans qualified in 1935 from the Middlesex Hospital and afterwards joined the Indian Medical Service.

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ADDRESSES OF DISEASE-INFECTED PREMISES

The list given below indicates, first, the county in which are situated the premises on which disease has been confirmed, followed by the postal address and date of outbreak.

SHEEP SCAB:

Westmorland.—Setterah Park, Askham, Penrith, Cumberland (Apr. 26th); Bampton Hall, Bampton, Penrith, Cumberland (Apr. 28th).

SLAUGHTERING ARRANGEMENTS

The largest conference in the history of the Meat Traders' Federation met in Brighton in mid-April. In its report of the proceedings the *Meat Trades Journal* states that Mr. L. J. Steward told the delegates that the Federation had for some time past received a stream of correspondence from Associations complaining of the inadequacy of slaughtering arrangements in many parts of the country. With the peak killings last autumn the stream had almost attained the dimensions of a torrent. These poor arrangements adversely affected the fresh meat industry in this country, for it meant their products were reaching the markets in a poor condition. They were perturbed, too, at the lack of facilities for training youths for slaughtering, and it seemed to him that greater encouragement to those wishing to enter this section of the industry had been given by private slaughterhouse owners. However, the Executive representatives put the case to Sir Henry Turner (Director of Meat Supplies) and other officials of the Meat and Livestock Division Slaughtering Section who were in many respects in complete agreement, admitting the standard of workmanship had deteriorated. They further agreed that new men should be trained for this work and that it was desirable to open additional slaughterhouses. Although they had been assured by Sir Henry the previous day that there would be no heavy killings this coming autumn they would be wise to look ahead and prepare for such things happening again. Consequently, Mr. Anderson, of the Slaughtering Section, had met a small sub-committee of the Executive, as a result of which it was decided to send a questionnaire to all Associations. This would ask for information as to the capacity and other recommendations of abattoirs in the district. Quite obviously, it was impossible to re-open every slaughterhouse; indeed, many were unfit for re-opening, but there were others eminently suitable. It was also agreed that fresh contracts could be opened for these private slaughterhouses in order that the owner could participate. They had heard a great deal about centralized slaughtering before the war, but if they could prove to the Ministry they were doing a good job through the private slaughterhouses it might be helpful later, when the whole question of slaughtering arrangements would be under discussion.

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THE INSTITUTE OF MEAT

Inaugural Lecture by Lord Horder

Giving the Inaugural Lecture to the Institute of Meat on April 17th, Lord Horder, who announced his consent to become the first Patron of the Institute, said that the fact that he had many interests overlapping theirs was sufficient justification for his being there.

Speaking on the present food situation, he stated that he had the privilege of being Chairman of the Standing Committee of Nutrition of the Food and Agricultural Organization of the United Nations, in which capacity he had just returned from Washington. Sir John Boyd Orr, Director-General of the Organization, was a man of indomitable energy and vision, unsurpassed as a leader. As his listeners were aware, the function of F.A.O. was to try to straighten out the queer anomaly by which in one part of the world there existed what was quaintly called a "surplus," while in another there was a clamour for food to prevent malnutrition and actual famine. Saying he was not optimistic about the immediate food prospects, his Lordship regretted there was a lag in "getting across" with the work of F.A.O. "I am afraid," he added, "the lag is more on the political side than on the side of experts and humanitarians. I feel that as the political boat rocks it is all the more important to keep on an even keel those other world organizations that depend on science and human considerations rather than politics."

Lord Horder said he accorded meat a very high place in the diet of any people, second, in fact, to our most staple food—bread. There was no need to remind them that meat was still regarded as the chief source of proteins, and consequently the most valuable food they possessed for the growth and repair of the human body. From it, too, the body could derive the sugar it required; Eskimos, who lived on it for months on end, were a very fit race. Furthermore, meat was easily cooked, not spoiled unduly by cooking, and fairly digestive. It did have one or two drawbacks; it was apt to vary in quality and was too expensive. To follow a vogue, it could be said that it had a small vitamin content, but with so many other foods supplying this need it was not a very important point against it.

Concluding his address, Lord Horder said that to him the function of the Institute of Meat was very clear. "That it has a great future is quite obvious to me; it is young, you have paid me a great honour by associating my name with its future activities and I shall be very proud to act as Patron. I never associate myself with anything merely for 'window dressing' and I am prone to take an active part in any group which pays me such a compliment. I think you have a great contribution to make to the health and happiness of the community, and that is my reason for accepting the compliment you have paid me."

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At its annual general meeting, the British Dairy Farmers' Association decided to forward a resolution requesting the Minister to give full consideration to the question of prohibiting the slaughter of young and suitable sheep and cattle with a view to rehabilitation of hill farms.

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At a recent sitting of the Standing Committee on the Agriculture Bill, clause 98, which made provision for the use of spring traps under Ministerial authority to kill hares and rabbits, was defeated.

CORRESPONDENCE

The views expressed in letters addressed to the Editor represent the personal opinions of the writer only and their publication does not imply endorsement by the N.V.M.A.

Correspondents should write as briefly as possible and letters should not exceed 350 words.

NEWCASTLE DISEASE

Sir,—I am somewhat surprised that Messrs. Gordon & Asplin, in their excellent summary of Newcastle disease, have not made reference to the important results obtained by Iyer in India using vaccines obtained from attenuated strains of Ranikhet virus. I am informed authoritatively that the trials with these vaccines, which started two or three years ago, have resulted in the successful control of Newcastle disease in Palestine, Ceylon and various parts of India, since vaccinated birds are immune in three days, and only some two to three per cent. of birds are lost.

Many poultry farmers in this country would willingly have their birds vaccinated if these vaccines were available to them. May one hope that the Ministry of Agriculture is considering the introduction of vaccination as a preventive, should their present slaughter policy not succeed in limiting the disease within a short period.

Yours faithfully,

The British Oil & Cake Mills Ltd., W. P. Blount.
Unilever House,
Blackfriars,
London, E.C.4.

April 28th, 1947.

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"INFECTIOUS CATARRHAL FEVER OF DOGS"

Sir,—I read with great interest Mr. R. S. Townson's article in *The Veterinary Record* of April 26th, 1947, and would like to congratulate him on the clearness of the description of a condition which has also been seen in my surgery for a period rather longer than the nine months to which he refers.

I beg to differ from Mr. Townson only in as far as I cannot rule out an adulterated form of canine distemper, the reason for my divergence of opinion being that I have seen the condition occur as a result of inoculation with canine distemper virus.

In connection with Mr. Townson's article I would like to express my fear that we will meet with quite a few developments in symptoms of diseases and their reaction to treatment.

Whilst up to 20 years ago practitioners' efforts aimed at the *destruction* of pathogenic organisms, treatment in the last decade has tended to *bacteriostasis*.

This trend seems to achieve an alteration in the strains and habits of microbes—for instance, their desensitization to sulpha drugs and penicillin. In some cases it may even leave rest-infections which though harmless to the carrier, might produce new diseases of unknown characteristics.

I can well imagine that the widespread use of sulpha drugs in distemper has so altered the relationship of virus and second invader that the virus now has developed an affinity to the central nervous system which the practitioner is unable to influence.

I fear that the medical and veterinary profession are faced with the problem of saving the individual with new antibiotics with the added danger of creating new diseases. Might it not be advisable to revert to the old bactericidal methods in addition to using the drugs?

Yours faithfully,

91, Watford Way, E. von Lustig-Lendva.
Hendon, London, N.W.4.